

AMENDMENTS TO THE CLAIMS

The claims in this listing will replace all prior versions, and listings, of claims in the application.

1. (Currently Amended) A detecting method for detecting a human face from an input image, comprising:

detecting at least first and second candidate eye areas for an eye first and second eyes and a plurality of candidate interval areas for an interval between the first and second eyes based on luminance characteristics of the input image;

~~detecting an area of the interval between eyes from a positional relationship between the candidate areas for an eye and the candidate areas for an interval between eyes~~ determining whether a candidate interval area among the plurality of candidate interval areas is between the first and second candidate eye areas;

designating the candidate interval area as the interval between the first and second eyes when the candidate interval area is determined to be between the first and second candidate eye areas; and

determining a face area based on the detected area of the designated interval between the first and second eyes.

2. (Currently Amended) The method according to claim 1, wherein the first and second candidate eye areas for an eye are detected from the luminance characteristics corresponding to a first plurality of segments in nearly horizontal directions portions of

the input image having a substantially horizontal alignment and a second plurality of portions of the input image having a substantially vertical alignment, and

wherein there are fewer of the second plurality of portions than of the first plurality of portions.

3. (Currently Amended) The method according to claim 1, wherein the candidate interval areas for an interval between eyes are detected based on the luminance characteristics corresponding to a plurality of areas with a small number of segments in the input image having fewer substantially horizontal portions and substantially vertical portions than a threshold amount.

4. (Currently Amended) The method according to claim 1, further comprising:  
dividing at least a part or whole of the input image into a plurality of small areas sub areas, including the first and second candidate eye areas and the candidate interval areas.

~~detecting candidate small areas for an eye and candidate small areas for an interval between eyes from luminance characteristics of each of divided small areas;~~

~~examining whether each of the candidate small areas for an interval between eyes is present between two of the candidate small areas for an eye; and~~

~~detecting an area of the interval between eyes based on the examined result.~~

5. (Currently Amended) The method according to claim 4, wherein the candidate small eye areas for an eye are detected using edge information of a plurality of pixels in the small areas sub areas.

6. (Currently Amended) The method according to claim 4, wherein the candidate ~~small-eye areas for an eye~~ are detected by obtaining a luminance histogram of a plurality of pixels in each of the ~~small-areas~~ sub areas, and comparing the luminance histogram between adjacent ~~small-areas~~ sub areas.

7. (Currently Amended) The method according to claim 4, wherein the candidate ~~small-interval areas for an interval between eyes~~ are detected using edge information of a plurality of pixels in the ~~small-areas~~ sub areas.

8. (Currently Amended) The method according to claim 7, wherein the candidate ~~small-interval areas for an interval between eyes~~ are detected using the edge information of the pixels in the ~~small-areas~~ sub areas adjacent each other in a vertical direction.

9. (Currently Amended) The method according claim 4, wherein the candidate ~~small-interval areas for an interval between eyes~~ are detected by obtaining a luminance histogram of a plurality of pixels in each of the ~~small-areas~~ sub areas, and comparing the luminance histogram between adjacent small areas.

10. (Withdrawn) A detecting method for detecting a human face from an input image, comprising:

dividing a part or whole of an image into a plurality of small areas;

classifying the small areas into at least two groups of the small areas in different ways;

detecting an area of an interval between eyes from luminance characteristics of an image of each of classified groups;

judging an overlap of the area of the interval between eyes to correct the area of the interval between eyes; and

determining a face area so that the face area includes the corrected area of the interval between eyes.

11. (Withdrawn) The method according to claim 10, wherein the small areas are classified into groups in different ways while moving a starting point for classifying so that a part of the small areas overlaps.

12. (Withdrawn) The method according to claim 10, wherein the small areas are classified into groups in different ways so that sizes of the small areas are different between the groups.

13. (Canceled)

14. (Currently Amended) A detecting method for detecting a human face from an input image, comprising:

~~detecting an area of an interval between~~ a plurality of candidate eye areas for first and second eyes based on luminance characteristics of the input image;

~~detecting candidate areas for both eyes so that the areas include the area of the an~~ interval between the first and second eyes;

examining one of luminance characteristics ~~or~~ and shape characteristics of the candidate eye areas for the first and second eyes to determine a position of a right eye and a position of a left eye; and

determining a face area ~~so that the face area includes~~ including the position of the right eye and the position of the left eye.

15. (Currently Amended) The method according to claim 1, wherein information ~~on~~ of a face in the face area is detected.

16. (Currently Amended) The method according to claim 15, wherein the information ~~on~~ of the face includes at least ~~either~~ one of a sex and an age.

17. (Currently Amended) A moving picture retrieval method, comprising:  
detecting the face area using the method according to claim 1 from a frame picture of a moving picture;

storing information ~~on~~ of a face in each area; and  
retrieving a moving picture using the information on the face.  
18. (Original) A face identifying method for identifying a face, comprising:  
detecting the face area using the method according to claim 1; and  
identifying a face using a feature vector of a face in each area and feature vectors of faces stored in a database.

19. (Withdrawn) A detecting apparatus for detecting a human face from an input image, comprising;

a dividing section that is configured to divide a part or whole of the image into small areas;

an eye candidate detecting section that is configured to detect candidate small areas for an eye from luminance characteristics of the small areas;

an interval between eyes candidate detecting section that is configured to detect candidate small areas for an interval between eyes from the luminance characteristics of the small areas;

an interval between eyes determining section that is configured to examine whether each of the candidate small areas for an interval between eyes is present between two of the candidate small areas for an eye to determine an area of the interval between eyes; and

a face determining section that is configured to determine a face area so that the face area includes the area of the interval between eyes determined in said interval between eyes determining section.

20. (Withdrawn) The detecting apparatus according to claim 19, further comprising:

a classifying section that is configured to classify the small areas into at least two groups of the small areas in different ways while moving a starting point for classifying so that a part of the small areas overlaps, in dividing the part or whole of the image into the plurality of small areas;

an interval between eyes area detecting section that is configured to detect an area of the interval between eyes from luminance characteristics of an image of each of classified groups; and

an overlap judging section that is configured to judge an overlap of a plurality of areas of the interval between eyes determined from each of classified groups in said interval between eyes area detecting section to correct the area of the interval between eyes;

wherein said face determining section determines a face area so that the face area includes the area of the interval between eyes corrected in said overlap judging section.

21. (Withdrawn) The detecting apparatus according to claim 19, further comprising:

a classifying section that is configured to classify the small areas into at least two groups of the small areas in different ways so that sizes of the small areas are different between the groups, in dividing the part or whole of the image into the plurality of small areas;

an interval between eyes area detecting section that is configured to detect an area of the interval between eyes from luminance characteristics of an image of each of classified groups; and

an overlap judging section that is configured to judge an overlap of a plurality of areas of the interval between eyes determined from each of classified groups in said interval between eyes area detecting section to correct the area of the interval between eyes;

wherein said face determining section determines a face area so that the face area includes the area of the interval between eyes corrected in said overlap judging section.

22. (Withdrawn) The detecting apparatus according to claim 19, wherein said face determining section determines the face area using colors contained in the area of the interval between eyes.

23. (Currently Amended) A detecting apparatus for detecting a human face from an input image, comprising:

~~an interval between eyes~~ eye candidate detecting section ~~that is configured to detect an area of an interval between~~ a plurality of candidate eye areas for first and second eyes based on a plurality of luminance characteristics of the input image;

~~an eye candidate setting interval detecting~~ section ~~that is configured to detect candidate areas for both eyes so that the areas include the area of the~~ an interval between the first and second eyes detected in said interval between eyes detecting section;

an eye determining section ~~that is configured to examine~~ one of luminance characteristics ~~or and~~ and shape characteristics of the candidate eye areas for ~~both the first and second eyes detected in by~~ said eye candidate ~~setting detecting~~ section to determine a position of a right eye and a position of a left eye; and

a face determining section ~~that is configured to determine a face area so that the face area includes~~ including the position of the right eye and the position of the left eye determined ~~in by~~ said eye determining section.

24. (Withdrawn) A moving picture retrieval apparatus comprising:

a moving picture storage section that is configured to store moving pictures;



the detecting apparatus according to claim 19 that determines a face area from a frame picture of the moving pictures;

an information detecting section that is configured to detect information on a face in the determined face area;

a face information storage section that is configured to store information detected in said information detecting section; and

a retrieval section that is configured to retrieve the information stored in said face information storage section.

25. (Withdrawn) A face identifying apparatus comprising;

the detecting apparatus according to claim 19 that determines a face area from the input image;

a database section that is configured to store in advance feature vectors of faces and names of persons to be identified; and

an identifying section that is configured to identify a face using a feature vector of a face in each area determined in said detecting apparatus that detects a human face and the feature vectors of faces stored in said database section.

26. (Currently Amended) A computer readable storage medium ~~with~~ storing a detecting program ~~stored therein~~ for detecting a human face from an image, said detecting program being executed by configured to cause a computer to detect a human face from an image, said program comprising perform at least:

~~detecting at least first and second candidate eye areas for an eye first and second eyes and a plurality of candidate interval areas for an interval between the first and second eyes based on luminance characteristics of the input image;~~

~~detecting an area of the interval between eyes from a positional relationship between the candidate areas for an eye and the candidate areas for an interval between eyes determining whether a candidate interval area among the plurality of candidate interval areas is between the first and second candidate eye areas;~~

~~designating the candidate interval area as the interval between the first and second eyes when the candidate interval area is determined to be between the first and second candidate eye areas; and~~

~~determining a face area based on the detected area of the designated interval between the first and second eyes.~~

27. (Currently Amended) A computer readable storage medium with storing a detecting program stored therein for detecting a human face from an image, said program being executed by configured to cause a computer to detect a human face from an image, said program comprising perform at least:

~~detecting an area of an interval between a plurality of candidate eye areas for first and second eyes based on a plurality of luminance characteristics of the input image;~~

~~detecting candidate areas for both eyes so that the areas include the area of the an interval between the first and second eyes;~~

examining one of luminance characteristics ~~or~~ and shape characteristics of the candidate areas for both eyes to determine a position of a right eye and a position of a left eye; and

determining a face area ~~so that the face area includes~~ including the position of the right eye and the position of the left eye.

28. (Currently Amended) A computer readable storage medium ~~with storing a moving motion picture retrieval program stored therein, said motion picture retrieval program configured to cause a computer to retrieve a moving picture, said program comprising perform at least:~~

~~detecting a face area according to the detecting method according to claim 1 from a frame picture of a moving picture~~ detecting at least first and second candidate eye areas for first and second eyes and a plurality of candidate interval areas for an interval between the first and second eyes based on a plurality of luminance characteristics of a frame picture of a motion picture;

determining whether a candidate interval area among the plurality of candidate interval areas is between the first and second candidate eye areas;

designating the candidate interval area as the interval between the first and second eyes when the candidate interval area is determined to be between the first and second candidate eye areas;

determining a face area based on the designated interval between the first and second eyes;

storing information ~~on~~of a face in each ~~the face~~ area ~~from the detected face area~~;  
and

retrieving a ~~moving motion~~ picture using the information ~~on~~of the face.

29. (Currently Amended) A computer readable storage medium ~~with storing a~~  
face identifying program ~~stored therein~~, said program ~~being executed by~~ configured to  
cause a computer to identify a face, said program ~~comprising~~ perform at least:

~~detecting a face area according to the detecting method according to claim 1~~  
detecting at least first and second candidate eye areas for first and second eyes and a  
plurality of candidate interval areas for an interval between the first and second eyes  
based on a plurality of luminance characteristics of an image;

determining whether a candidate interval area among the plurality of candidate  
interval areas is between the first and second candidate eye areas;

designating the candidate interval area as the interval between the first and second  
eyes when the candidate interval area is determined to be between the first and second  
candidate eye areas;

determining a face area based on the designated interval between the first and  
second eyes; and

identifying a face using a feature vector of a ~~the face in each detected~~ extracted  
from the face area and compared with a plurality of feature vectors of faces stored in  
advance in a database.